1883.

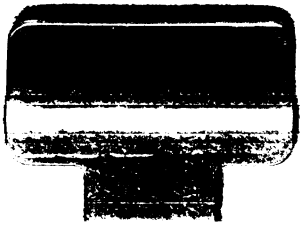
TRANSACTIONS

OF THE

NEW ENGLAND

WATER WORKS ASSOCIATION.

NEW BEDFORD:
MERCURY PUBLISHING COMPANY, PRINTERS.
1883.



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NEW ENGLAND WATER WORKS ASSOCIATION.

OFFICERS, 1883-4.

President,

FRANK E. HALL, Worcester, Mass.

Vice Presidents,

CHARLES K. WALKER, Manchester, N. H.
HORACE G. HOLDEN, Lowell, Mass.
EDWIN DARLING, Pawtucket, R. I.
NATHANIEL I. JORDAN, Auburn, Me.
SHERMAN E. GRANNIS, New Haven, Conn.

Secretary,

ROBERT C. P. COGGESHALL, New Bedford, Mass.

Treasurer,

EDWIN DARLING, Pawtucket, R. I.

Executive Committee,

The above named officers with

HENRY W. ROGERS, Lawrence, Mass.
THOMAS C. LOVELL, Fitchburg, Mass.
WILLIAM R. BILLINGS, Taunton, Mass.

Finance Committee,

JAMES H. HATHAWAY, New Bedford, Mass.
J. STEWART BROWN, Worcester, Mass.
ALBERT S. GLOVER, Newton, Mass.

The Third Annual Meeting will be held at Lowell, Mass., on Thursday and Friday, June 19th and 20th, 1884. For this meeting the Executive Committee have selected the following named topics for discussion:

1st. *Service Pipes, material, size, etc.*

The discussion to be opened by a paper to be presented by W. H. Richards, Esq., of New London, Conn.

2d. *Filtration of Water.*

The discussion to be opened by a paper to be presented by H. W. Rogers, Esq., of Lawrence, Mass.

PREAMBLE, CONSTITUTION AND BY-LAWS.

PREAMBLE.

We, the undersigned, desirous of forming an Association for the exchange of information pertaining to the management of "Water Works" for the mutual benefit of consumers and "Water Companies" and for the purpose of securing economy and uniformity in the operation of Water Works, do hereby associate ourselves and adopt the following:—

CONSTITUTION AND BY-LAWS.

ARTICLE I.

NAME AND OBJECTS.

SECTION 1. The name of the Association shall be "The New England Water Works Association."

SECTION 2. The object of this Association shall be the promotion and advancement of knowledge, scientific and practical, in all matters relating to the construction and management of "Water Works" and the distribution and consumption of Water, the establishment and maintenance of a spirit of "fraternity" between the members of the Association by social intercourse, and by friendly interchange of information and ideas on the before-mentioned subjects.

ARTICLE II.

SECTION 1. The members of this Association shall consist of two classes. Active members and Fine members.

SECTION 2. To be eligible as an Active member, a person must be a Superintendent, Registrar, Secretary, Treasurer or Engineer of a Water company.

SECTION 3. Active members shall pay an initiation fee of five dollars, and shall pay the sum of two dollars annually thereafter, which sum shall be paid in advance.

SECTION 4. No member whose annual payment shall be in arrears one year shall be entitled to vote or participate in the deliberations of the Association.

SECTION 5. Any member may retire from membership by giving written notice of his desire to the Secretary and by the payment of all annual dues to that date, but he shall remain a member and be liable to the payment of annual dues till such payments are made.

SECTION 6. A member may be expelled from the Association after due notice to him by a report and motion to that effect made by the executive committee at a general meeting of the Association. The vote shall be by ballot and shall require two-thirds of the votes cast for its adoption.

ARTICLE III.

FINE MEMBERS.

SECTION 1. Persons or firms engaged in furnishing materials for the construction and maintenance of Water Works desiring to join the Association may be admitted as members by the usual form on the payment of ten dollars and be entitled to one representative at each meeting, who shall not be entitled to vote, but may take part in any discussion, if permission is given by the meeting.

ARTICLE IV.

SECTION 1. All candidates for membership shall be proposed by a member of the executive committee and notice thereof shall be given by the Secretary to the Association for its action. The election of an applicant for membership shall be by ballot and each person shall receive two-thirds of the number of ballots cast to be elected.

SECTION 2. If any application for membership on being balloted for be rejected, no notice shall be taken of the application or record of the same be made in the minutes, and the admission fee shall be returned.

SECTION 3. New members shall be formally introduced to the Association by the presiding officer, after being elected; they shall subscribe their names to the Constitution of the Association, in a roll-book of the same, and they shall each at the same time receive a copy of the Constitution and By-Laws of the Association.

ARTICLE V.

OFFICERS.

SECTION 1. The officers shall consist of a President, five Vice Presidents, Secretary and Treasurer, to be elected annually by ballot.

SECTION 2. The officers of the Association, with three other members who shall be elected for that purpose, shall constitute the Executive Committee.

SECTION 3. A Finance Committee, consisting of three members of the Association, shall be chosen.

All officers shall serve for one year, or until their successors are elected.

ARTICLE VI.

DUTIES.

SECTION 1. The President shall preside at all meetings, or in case of his absence the senior Vice President present shall preside.

SECTION 2. The affairs of the Association shall be managed by the Executive Committee, subject to control of the Association by its action in general meeting. All questions in Executive Committee shall be decided by majority vote and five members shall be a quorum.

The Executive Committee shall have control of the property and management of the affairs of the Association, shall provide suitable rooms for all annual and other meetings and shall have power to expend the funds of the Association; *provided*, that no indebtedness shall be incurred in excess of the funds in the hands of the Treasurer. All papers read at meetings of the Association must relate to matters connected with the objects of the Association, and must be approved by the Executive Committee before being read, and they shall also suggest topics for discussion.

SECTION 3. The Secretary shall keep the records of all meetings, conduct all correspondence, receipt for all fees and dues, and pay to the Treasurer all money received, taking his receipt therefor. In addition to these duties he shall read minutes and also papers and communications, if the authors desire it, and discharge such other duties as may be required by the Constitution and By-Laws appertaining to his department. He shall have such compensation for his services as the Executive Committee may determine.

SECTION 4. It shall be the duty of the Treasurer to receive from the Secretary all moneys for the Association, to keep correct account of all receipts and expenditures, and to pay all demands against the Association

when approved by the President. At the annual meeting he shall exhibit a statement of his accounts and shall give such bonds as may be required by the Executive Committee.

SECTION 5. The Finance Committee shall meet on the day of the Annual Meeting of the Association, at least one hour before the opening of the meeting, to receive from the Treasurer a statement of his accounts and to audit the same. They shall hold such other meetings as the interest of the Association may require.

SECTION 6. The officers of the Association shall assume office immediately after the close of the meeting at which they have been elected. They shall hold meetings at the call of the President, or, in the absence of the President, at the call of the senior Vice President.

ARTICLE VII.

SECTION 1. The Annual Meeting of the Association shall be held on the third Thursday in June, in each year, at 10 o'clock a. m., at such place as shall be determined by the Association at the previous annual meeting. Other general meetings of the Association may be held at such times and places as shall be directed at the previous meeting.

SECTION 2. At any Regular Meeting of the Association, ten members shall be a quorum for the transaction of business.

SECTION 3. The Secretary shall send a notice to all members of the Association at least fourteen days before each General Meeting.

SECTION 4. Questions shall be decided by any convenient form of voting, the presiding officer to have the casting vote when necessary. Questions of special nature shall be decided by ballot, if demanded.

ARTICLE VIII.

SECTION 1. Any member of a Water Board or Board of Water Commissioners or Board of Trustees of any Water Works is cordially invited to be present at any meeting of the Association as Honorary Member. Any member, with the concurrence of the presiding officer, may admit a friend at each meeting of the Association, but such person shall not take part in any discussion unless permission to do so be given by the meeting.

SECTION 2. All papers, drawings or models submitted to the meetings of the Association, shall be and remain the property of the authors.

SECTION 3. All propositions for adding to, or altering any of the provisions of the foregoing Constitution, shall be submitted to the Executive Committee, who may bring it before the next meeting of the Association, and shall do so on the written request of any five members of the Association, and, if two-thirds of the members present shall vote in favor of such alteration or amendment it shall be adopted.

ORDER OF BUSINESS.

At the Annual Meeting of the Association the order of business shall be:—

First. The reading of the minutes of the last meeting.
Second. The reading of applications, notices, and reports for new membership.
Third. The election and introduction of new members.
Fourth. The address of the President.
Fifth. Report of the Executive Committee on the management of the Association for the previous year.
Sixth. The report of the Treasurer.
Seventh. The report of the Finance Committee.
Eighth. The report of Special Committees.
Ninth. The Election of Officers.
Tenth. The Reading of Papers of which notice has been given and Discussion upon the same.
Eleventh. General Business.

At other General Meetings of the Association the Order of Business shall be the same, except as to the 5th, 6th, 7th and 9th clauses.

MEETING AT SALEM.

ESSEX HOUSE, Salem, Mass.,
Wednesday, October 11, 1882.

Meeting was called to order at 11 o'clock, President Lyon in the chair.

The names of those present were recorded as follows, viz.:

ACTIVE MEMBERS.

R. W. BAGNELL,
JAMES M. BATTLES,
R. C. P. COGGESHALL,
EDWIN DARLING,
ALBERT S. GLOVER,
FRANK E. HALL,
W. W. HAWKES.
HORACE G. HOLDEN,
H. N. HYDE, JR.,
JAMES W. LYON,
HIRAM NEVONS,
HENRY W. ROGERS,
JOSEPH G. TENNEY,

CANDIDATES FOR MEMBERSHIP.

J. STEWART BROWN,
MOSES JOY, JR.,
C. W. MORSE,
ALBERT F. NOYES,
W. B. SHERMAN,
JOHN C. KELLEY.

The following were present by invitation:—

HON. SAMUEL CALLEY,	Mayor of Salem.
A. A. HAGGETT,	President Lowell Water Board.
WILLIAM N. OSGOOD,	Lowell Water Board.
FRANK WOOD,	Lowell Water Board.
D. T. PORTER,	President Lawrence Water Board.

The following applications for membership were presented, each being accompanied with a favorable recommendation from the Executive Committee:—

FOR ACTIVE MEMBERSHIP.

J. STEWART BROWN,	Water Registrar,	Worcester, Mass.
MOSES JOY, JR.,	President and Superintendent,	Milford, Mass.
CHARLES W. MORSE,	Superintendent,	Haverhill, Mass.
ALBERT F. NOYES,	City Engineer,	Newton, Mass.
W. H. RICHARDS,	Superintendent,	New London, Conn.
HORACE B. WINSHIP,	Superintendent,	Norwich, Conn.

FOR FINE MEMBERSHIP.

WILLIAM B. SHERMAN,	Corliss Steam Engine Co.,	Providence, R. I.
J. J. NEWMAN & CO.,	Contractors,	Providence, R. I.
NATIONAL METER CO.,	John C. Kelley, Prest.,	New York.

An informal discussion was had on the subject: "The best methods of detecting and preventing the waste of water."

Hiram Nevons, of Cambridge, Edwin Darling, of Pawtucket and Frank E. Hall, of Worcester, were appointed a committee to prepare a paper for discussion at the next meeting on the topic: "The causes and prevention of the waste of water."

C. W. Morse of Haverhill, A. S. Glover, of Newton, H. G. Holden of Lowell, Edwin Darling of Pawtucket, and J. W. Lyon of Salem, were appointed a committee to prepare a paper for discussion at the next meeting on the topic: "Uniformity in compiling the annual report."

A. S. Glover, of Newton, A. F. Noyes, of Newton, and H. W. Rogers, of Lawrence, were appointed a committee to prepare a paper for discussion at the next meeting on the topic: "Water Meters."

Mr. Darling presented a copy of the record of duty made by the Corliss pumping engine at Pawtucket, R. I., for the seven months ending August 31st, 1882. This interesting record was carefully examined by those present, and the copy presented to the meeting was ordered on file.

Adjourned.

R. C. P. COGGESHALL,
Secretary.

MEMORANDUM.—After the adjournment of the business meeting dinner was served, at the close of which Hon. Samuel Calley, Mayor of Salem, addressed the members of the Association, extending a cordial welcome to the city of Salem. President Haggett, of the Lowell Water Board, made a brief speech, abounding in humorous allusions.

The members of the Association were then driven to the different interesting points of the Salem Water Works.

At the distributing reservoir a close examination was made of the new check valve arrangement for increasing the pressure in the distributing mains, and great satisfaction was expressed with its operation.

At the pumping station at Wenham Lake the following resolution was unanimously adopted:

Resolved: That the convention extend a vote of thanks to President James W. Lyon, for his active endeavors and ample provision for the comfort and pleasure of the members upon this occasion.

PROCEEDINGS AT THE SECOND ANNUAL MEETING.

BAY STATE HOUSE, Worcester, Mass.,
Thursday, June 21, 1883.

The convention was called to order at 10 o'clock A. M., by President James W. Lyon, of Lynn, who welcomed the members both old and new.

On motion of Mr. Hall, of Worcester, *voted* that the reading of the record of the last meeting be dispensed with.

The Secretary presented a favorable report of the Executive Committee on the following list of applicants for membership.

FOR ACTIVE MEMBERSHIP.

WILLIAM R. BILLINGS,	Superintendent,	Taunton, Mass.
THOMAS H. BRADY,	Superintendent,	New Britain, Conn.
GEORGE A. ELLIS,	City Eng'r and Water Registrar,	Springfield, Ms.
THOMAS A. HODGE,	Superintendent,	North Adams, Mass.
DAVID W. HORAN,	Superintendent,	Clinton, Mass.
NATHANIEL I. JORDAN,	Treas. Aqueduct Co.,	Auburn, Me.
CHARLES A. NORTHEND,		New Britain, Conn.
JAMES PORTER,	Superintendent,	Greenfield, Mass.

FOR FINE MEMBERSHIP.

CHAPMAN VALVE MF'G CO., by Jason Giles, General Manager, Indian Orchard, Mass.
EQUITABLE WATER METER CO,, No. 34 Beach street, Boston, Mass.
HARTFORD METER CO., Hartford, Conn.
KNOWLES STEAM PUMP CO., by Wilbur D. Fiske, Gen. Agt., Boston, Mass.
UNION WATER METER CO., by J. C. Otis, Treasurer, Worcester, Mass.

The foregoing were elected members by separate ballot.

The Secretary then read the following communication :—

TERRE HAUTE, IND., June 11, 1883.

R. C. P. COGGESHALL, Sec'y N. E. W. W. Asso. :

Dear Sir :—Your invitation to the meeting of your Association June 21st and 22d received. It would give me great pleasure to attend, were it possible, but having but just returned from Buffalo, cannot spare the time. Will you kindly extend to all the members an invitation to join the American Water Works Association? We meet in Cincinnati next April. There is a very good line of topics for discussion, assigned to able men who will do them justice in their reports. We, as an Association, wish for information from every source and, knowing as we do, that some of the first water works managers in the country are members of your body. Hope that we may have the benefit of your experience and study.

Respectfully,

J. G. BRIGGS,
Prest. American Water Works Association.

Letters expressing regret at inability to attend the meet-

ing of the Association were received from the following named persons:—

J. WARREN COTTON, Cambridge, Mass.,
J. JAMES R. CROES, New York,
A. S. GLOVER, Newton, Mass.,
JONAS M. CLARK, Northampton, Mass.,
GEORGE E. EVANS, Lowell, Mass.,
B. H. HULL, Bridgeport, Conn.

A letter was read from the Hon. Phineas Ball, President of the Union Water Meter Company of Worcester, extending an invitation to the members of the Association to visit the Works of the Company sometime during the day.

Mr. Hall extended an invitation to visit the Water Works and Fire Engine Houses of Worcester.

On motion of Mr. Hawkes, of Malden, voted that the two invitations just extended be accepted and that the Executive Committee be empowered to make the necessary arrangements.

Mr. Hall stated that the Executive Committee had accepted an invitation for the members of the Association to visit the works of the Chapman Valve Manufacturing Company Indian Orchard, Mass., on the following day. In order that the necessary arrangements be made for the transportation, he desired to know at the present time, the exact number who would go.

President Lyon then said: The next business, gentlemen, is the address of the President, and I am very sorry to say that the mantle has fallen upon a person who has very little experience in public speaking. I can work better than I can talk. I have written out a few ideas very briefly, because I think the shorter these things are, the better.

THE PRESIDENT'S ADDRESS.

Gentlemen of the New England Water Works Association :—It is with a great deal of pleasure that I meet so many here at this time, and I cannot express my pleasure in words fitting to the subject.

As early as 1877, efforts were made to form an association of this kind, because at that time it had seemed to have become a necessity and that it would be the means of disseminating knowledge for the better government of the vast interest confided to our care by the various bodies that we represent, and by the medium of such an organization each member would be sure to gain new ideas. With this object in view, some four hundred circulars were sent to various parts of the country, from which only seventy replies were received. Of this small number there were those who thought the object a good one. Others replied that it was too comprehensive in taking in the whole country. There were others who thought there was no need of such an organization. The lack of enthusiasm exhibited, together with the pressure of private interests, caused the abandonment of the project, although it was certain that if the project were carried into effect great good was sure to be the result. When a few of us again started the project in 1882, it was with some misgivings that the times were not ripe for the formation of such an organization. But the hearty response to the call for the first meeting in Boston, and the general desire expressed that the organization should be perfected, led to the meeting of one year ago. Another meeting was held last fall, at Salem, which was well attended, and I trust was both pleasant and profitable to all.

During the past year there has been no unusual development in improving the management or construction of water works, which has come to my knowledge, and al-

though throughout the country almost every town of any pretension whatever has either in contemplation or already in operation some system of water works, there does not seem to be any strikingly new improvement developed within the past few months. And yet there is a large field for inventive genius to operate in. Much has yet to be learned in the direction of "prevention of waste" and "increase of supply." A question that is attracting much attention is the proper preservation of water in storage reservoirs from impurities, such as "sewage," "wash of land," or "vegetable growth." My own experience in this direction has been limited, and I hope to profit largely from the experience of others. There are questions which will constantly arise which can only be satisfactorily answered by those who have had actual experience: the comparative advantage and cost of various kinds of pipe for distribution and service supply; the best form of gate and service boxes; the best method of tapping the mains; whether it is best for the corporation or plumber to make the connections for the services; the remedies for the many evils that exist in our works. In fact, when we once begin there is hardly an end, and the experience of almost every one will be different, so that every one will be enabled to learn something from the experience of others. There is also much for members of water boards to learn. The positions we fill constantly bring us in contact with the public, and questions are continually arising which are referred to us for decision or report. In addition to the care of the works, and the natural anxiety we have to do our work well, we have to consider too often the policy of those who have been placed over us. Therefore, to be prompt and effective in the discharge of our duties, we should have the entire confidence of those to whom we are responsible, and I think it a very wise provision of our Constitution that all members of water boards or of water com-

missions are invited to be with us, to hear and see what manner of men we are, and by their presence sanction any movement that may be made to improve the present methods of managing water departments. I think it would be well for each city and town to provide for the necessary expense that their officials are obliged to incur in attending these conventions, for the knowledge that is disseminated is to be applied for the direct benefit of the city or town itself, and not for the personal benefit of the Superintendent or Water Registrar.

There are papers to be read and discussions will follow. Let us all remember that we are here to learn. Our one great object is mutual improvement. I would therefore counsel close attention to all remarks and hope that each one will express his own opinion as best he may.

There are other matters now to be considered and I will take no more time, but with my best wishes for the Association and for each and every individual member of it, and with many thanks for the honor you have shown me, we will now proceed to the next business.

The application of the George F. Blake Manufacturing Co., by George F. Blake, Jr., No. 44 Washington street, Boston, for fine membership, was received, endorsed by the executive committee. The company was then elected by ballot.

The roll was then called and the following list were those found to be present:

ACTIVE MEMBERS.

WILLIAM R. BILLINGS,	H. N. HYDE, Jr.,
J. STEWART BROWN,	N. I. JORDAN,
R. C. P. COGGESHALL,	THOMAS C. LOVELL,
EDWIN DARLING,	JAMES W. LYON,
GEORGE A. ELLIS,	C. W. MORSE,
ROBERT M. GOW,	HIRAM NEVONS,

S. E. Granniss,
Frank E. Hall,
Joseph C. Hancock,
James H. Hathaway,
W. W. Hawkes,
Thomas A. Hodge,
Horace G. Holden,
David W. Horan,
Charles A. Northend,
W. H. Richards,
H. W. Rogers,
H. L. Schleiter,
Phineas Sprague,
J. G. Tenney,
C. K. Walker,
W. C. Wilcox.

FINE MEMBERS.

George F. Blake Manfg. Co., by George F. Blake, Jr.
Corliss Steam Engine Co., by William B. Sherman, Secretary.
Equitable Water Meter Co., by Charles H. Baldwin.
Hartford Meter Co., by E. C. Terry.
Knowles Steam Pump Co., by Wilbur D. Fiske, General Agent.
National Meter Co., by John C. Kelley, President.
Union Water Meter Co., by Phineas Ball, President, and J. C. Otis, Treasurer.

The following were visitors:—

Nathaniel Dennet,	Superintendent,	Somerville.
Charles E. Bliss,	of Water Board,	Attleboro.
L. T. Carpenter,	of Water Board,	Attleboro.

The Hon. Charles P. Brady, who was present, was here introduced to the Association.

The report of the executive committee on the management of the Association for the previous year, was then presented.

REPORT OF THE EXECUTIVE COMMITTEE.

WORCESTER, MASS., June 20, 1883.

To the President and members of the New England Water Works Association:

GENTLEMEN:—The organization of our Association was completed at Boston, on the 21st day of June, 1882, at which time it was decided to hold a meeting the following October, at Salem, Mass.; the meeting was held at the place agreed upon on the 11th of October. Three topics were assigned to committees, the several committees named to prepare papers for discussions at the following annual meeting.

In connection with the meeting at Salem, we wish to notice the courtesy shown to the members of the Association by our worthy President in his efforts to make our visit one of profit as well as of pleasure.

It is gratifying to be able to report that the affairs of the Society are in a prosperous condition, and that we are now fairly equipped to do good service for those objects for which we are organized.

At this time, we number 37 active, and 6 fine members, a total of 43. This we consider a good showing for the first year, yet it should be our constant aim to make our discussions of such a high order, that no water works manager in New England can feel that he can well afford to be outside of the ranks of our Association.

Accompanying this report is the financial statement of the Secretary, from which it will be seen that the receipts from initiation fees have been $245.00, all of which have been paid over to the Treasurer.

From the report of the Treasurer, which will be presented at this meeting in detail, we learn that the expenses to this time, amount to $87\frac{86}{100}$, leaving a balance of $157\frac{14}{100}$.

At the time of organization one year ago, the Secretary was empowered to procure all necessary books and papers; this he has done, and we wish to bear testimony to the systematic and very neat manner in which the work has been done; in fact, we find his books and papers in a highly creditable condition.

In conclusion, we wish to return thanks to all members, who have, by their assistance, aided us in the work of placing our organization on a sound and healthy basis.

Respectfully submitted,

JAMES W. LYON,
CHAS. K. WALKER,
HIRAM NEVONS,
EDWIN DARLING,
HENRY L. SCHLEITER,
FRANK E. HALL,
J. G. TENNEY,

Executive Committee
N. E. W. W. A.

R. C. P. COGGESHALL, IN ACCOUNT WITH

NEW ENGLAND WATER WORKS ASSOCIATION

DR.

1882.						
June	21st,	To Cash	James W. Lyon,	Initiation	fee,	$5.00
"	"	"	Edwin Darling,	"	"	5.00
"	"	"	Horace G. Holden,	"	"	5.00
"	"	"	Hiram Nevons,	"	"	5.00
"	"	"	Phineas Sprague,	"	"	5.00
"	"	"	A. H. Martine,	"	"	5.00
"	"	"	C. K. Walker,	"	"	5.00
"	"	"	Addison Lane,	"	"	5.00
"	"	"	R. C. P. Coggeshall,	"	"	5.00
"	"	"	Robert M. Gow,	"	"	5.00
"	"	"	Albert S. Glover,	"	"	5.00
"	"	"	Frank E. Hall,	"	"	5.00
"	"	"	Thomas C. Lovell,	"	"	5.00
"	"	"	Joseph G. Tenney,	"	"	5.00
"	"	"	J. Warren Cotton,	"	"	5.00
"	"	"	James M. Battles,	"	"	5.00

June	21st,	To Cash	H. L. Schleiter,	Initiation	fee,	$5.00	
"	"	"	W. W. Hawkes,	"	"	5.00	
"	"	"	H. N. Hyde,	"	"	5.00	
"	"	"	W. F. Hill,	"	"	5.00	
July	8	"	W. C. Wilcox,	"	"	5.00	
"	24	"	W. T. Dotten,	"	"	5.00	
"	13	"	R. W. Bagnell,	"	"	5.00	
"	25	"	H. W. Rogers,	"	"	5.00	
"	"	"	J. C. Hancock,	"	"	5.00	
Aug.	10	"	S. E. Granniss,	"	"	5.00	
"	17	"	J. H. Hathaway,	"	"	5.00	
Sept.	21	"	Jonas M. Clark,	"	"	5.00	
Oct.	3	"	H. B. Winship,	"	"	5.00	
"	7	"	Nat'l Meter Co.,	"	"	10.00	
"	11	"	J. J. Newman & Co.,	"	"	10.00	
"	"	"	W. B. Sherman,	"	"	10.00	
"	"	"	J. Stewart Brown,	"	"	5.00	
"	"	"	Moses Joy, Jr.,	"	"	5.00	
"	"	"	C. W. Morse,	"	"	5.00	
"	"	"	A. F. Noyes,	"	"	5.00	
"	"	"	W. H. Richards,	"	"	5.00	
1883.							
March	3d	"	Chas. A. Northend,	"	"	5.00	
"	"	"	Thomas H. Brady,	"	"	5.00	
May	9	"	Hartford Meter Co.,	"	"	10.00	
June	8	"	James Porter,	"	"	5.00	
"	12	"	Chapman Valve Co.,	"	"	10.00	
"	14	"	Union Water Meter Co.,		"	10.00	$245.00

1882.		CR.		
Oct.	11	By Cash paid Edwin Darling, Treasurer,	$200.00	
1883.				
June	20	" " "	45.00	$245.00

The report was received and on motion placed on file.

The report of the Treasurer was then presented :—

EDWIN DARLING, TREASURER, IN ACCOUNT WITH

NEW ENGLAND WATER WORKS ASSOCIATION,

1882.		DR.	
October	11th,	Received of R. C. P. Coggeshall, Secretary,	$200.00
1883.			
June	20th,	" " " " "	45.00
			$245.00

CR.

1882.		
October 11th, paid A. A. White, (seal),	$8.00	
" " " E. Dews, (record books),	11.05	
" " " C. F. Cushing, (valise for books),	6.00	
" " " Mercury Publishing Co., (printing),	38.25	
" " " R. C. P. Coggeshall, (postage, etc.),	8.99	
" " " Deposited in Providence County Savings Bank,	127.71	
1883.		
June 20th, paid Mercury Publishing Co., (printing),	10.75	
" " R. C. P. Coggeshall, (postage),	4.82	
" " Balance on hand,	29.43	
		$245.00
1883.		
June 20th, Balance, deposit in Providence County Savings Bank,	127.71	
" Balance, cash on hand,	29.43	
		$157.14

Respectfully submitted,

EDWIN DARLING, Treasurer.

Correct:

HORACE G. HOLDEN, for Committee on Finance.

The report of the Treasurer was received and on motion placed on file.

On motion, voted that a committee of three be appointed by the Chair to nominate officers for the ensuing year.

The Chair appointed Messrs. Nevons of Cambridge, Rogers of Lawrence and Darling of Pawtucket.

The committee retired and Mr. William B. Sherman, of the Corliss Steam Engine Co., Providence, R. I., was called upon for remarks. Mr. Sherman presented each one present, a blue print diagram showing graphically the duties of pumping engines and the corresponding amounts of fuel required to be consumed under different heads, and explained its uses, which are simply to save long cal-

culations in estimating the duty on amount of fuel consumed by any engine, where exact figures are not required.

On motion of Mr. Holden, voted that the thanks of this Association be tendered to Mr. Sherman for the diagrams and explanation.

The committee on nominations here returned and rendered the following report:

FOR PRESIDENT.

FRANK E. HALL, of Worcester, Mass.

FOR VICE PRESIDENTS.

CHARLES K. WALKER, of Manchester, N. H.
HORACE G. HOLDEN, of Lowell, Mass.
EDWIN DARLING, of Pawtucket, R. I.
NATHANIEL I. JORDAN, of Auburn, Me.
SHERMAN E. GRANNISS, of New Haven, Conn.

FOR SECRETARY.

ROBERT C. P. COGGESHALL, of New Bedford, Mass.

FOR TREASURER.

EDWIN DARLING, of Pawtucket, R. I.

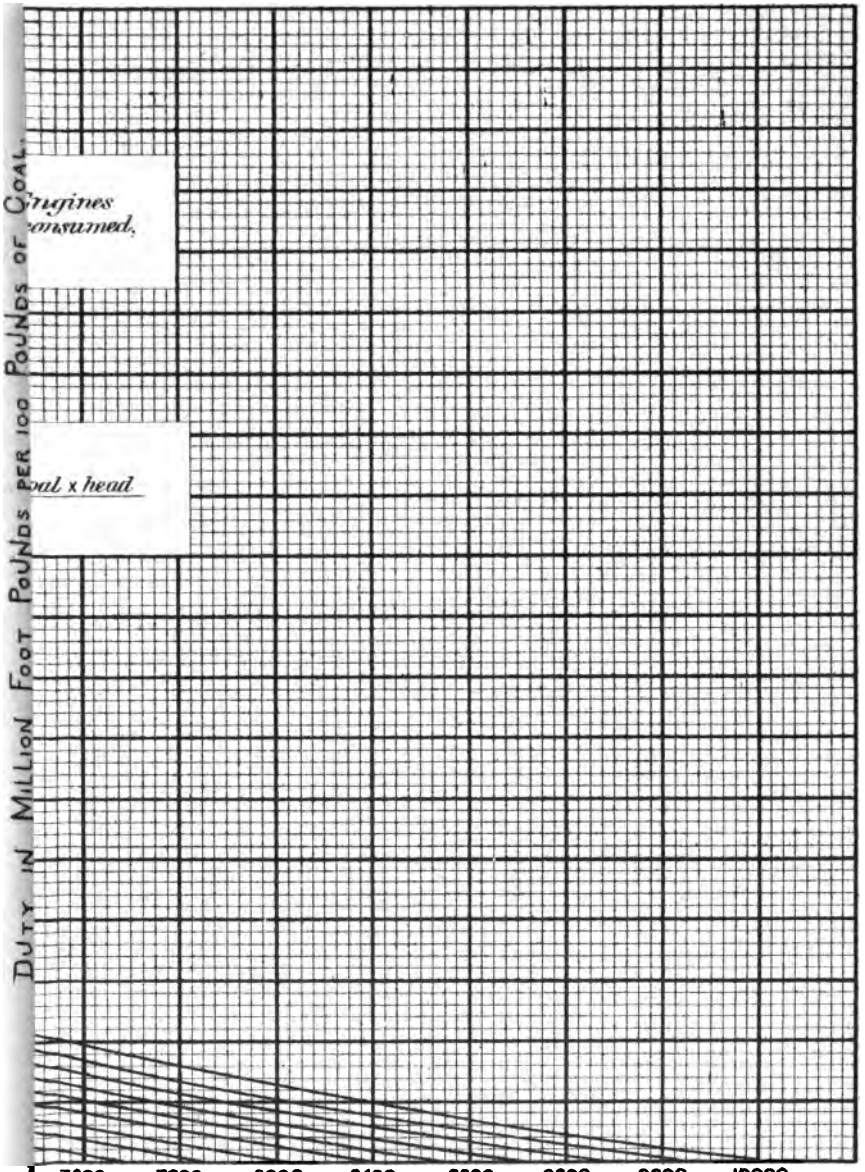
EXECUTIVE COMMITTEE.

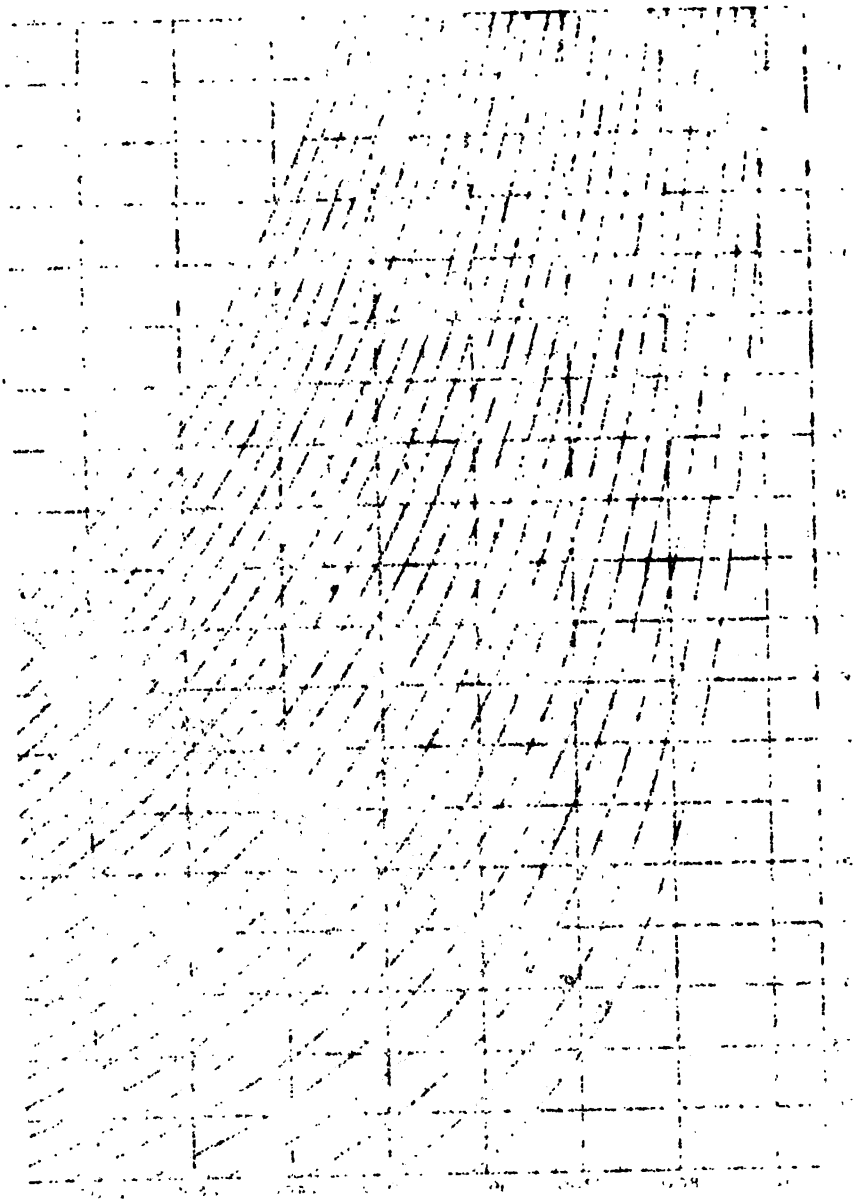
The above named officers, with—

HENRY W. ROGERS, of Lawrence, Mass.
THOMAS C. LOVELL, of Fitchburg, Mass.
WILLIAM R. BILLINGS, of Taunton, Mass.

FINANCE COMMITTEE.

JAMES H. HATHAWAY, of New Bedford, Mass.
J. STEWART BROWN, of Worcester, Mass.
ALBERT S. GLOVER, of Newton, Mass.


Engines
consumed,
coal x head
DUTY IN MILLION FOOT POUNDS PER 100 POUNDS OF COAL.
7200
7600
8000
8400
8800
9200
9600
10000
William B. Sherman, Providence, R.I.



On motion, voted that the report of the committee be accepted and that the Secretary be instructed to cast the vote of the convention for the above named nominees.

The ballot was accordingly cast and the above named list of officers declared elected for the ensuing year.

Mr. Hall, on taking the chair, said:

GENTLEMEN OF THE ASSOCIATION:—I heartily thank you for the honor you have seen fit to confer upon me. It will be my endeavor to perform the duties devolving upon me to the best of my ability and trust to receive your hearty coöperation and support. I will not stop to read the speech which I have prepared but we will proceed at once with our regular business.

The place of holding the next annual meeting was then discussed, and an invitation was received from Mr. Holden, of Lowell, to meet in that city.

Mr. Lyon suggested an amendment to the constitution whereby the meetings might be held earlier or later in the year. It was very inconvenient to attend in June, just when the work of the summer was beginning. He suggested April, September or October as a better time.

Mr. Darling said the matter had been thoroughly discussed already, and that it had been demonstrated that very day, that June was the best month in which to see water works. He hoped they would try the present time at least one year longer.

On motion of Mr. Darling, voted that the invitation of Mr. Holden be accepted, by appointing the next annual meeting to be held at Lowell, Mass.

Mr. Darling extended an invitation for the Association to meet at Pawtucket, R. I., sometime in September, for the purpose of inspecting the water works in that place.

On motion, voted that the invitation of Mr. Darling be accepted, and that all necessary arrangements for the visit be made by the executive committee.

The meeting here adjourned to 7.30 p. m.

Dinner was served at one o'clock, at the close of which, brief remarks were made by Mayor S. E. Hildreth, President of the Common Council, E. O. Parker and J. H. Rollins, agent of the Worcester Gas Light Co. Chief Engineer S. E. Combs, Aldermen Brady, Councilman Childs and Captain Williamson, of the Fire Patrol, were present as invited guests. After the speaking, the members with their guests took carriages and were first driven to the Fire Patrol house, where they were shown how a "quick hitch" is made in the Worcester fire department. The place next visited was the works of the "Union Water Meter Company," where all the details of manufacturing water meters were displayed and minutely explained. Next, a visit was made to Tatnuck Brook and the Holden Reservoir. On the way, a brief stop was made to inspect the work of a large gang who were laying a line of thirty-inch pipe to connect with the new receiving reservoir now being constructed on Tatnuck Brook, about a mile below the Holden Reservoir. At the site of the receiving reservoir a large gang were busily employed. The water flowing in the brook at this place occasioned much favorable comment on account of its clearness. Considerable amusement was created by the wide range of estimates placed on the quantity of water flowing in the stream per day. It was authoritatively stated to be running at the rate of 2,250,000 gallons daily. The next halt was made at the Holden Reservoir, where the new dam of the large storing reservoir was seen in process of construction. The plans of the work were minutely explained to the visitors by the City Engineer, Charles A. Allen, and President Hall. After a thorough examination of the work the party returned to the city and a stop was made at the Chemical Extinguisher house, where Capt. Flynn showed his ingenuity in opening and closing doors, extinguishing gas lights, and the "quick hitch," all done by clock work, or wires

connected with the fire alarm. The next stop was made at the engine house on Prescott street, when Chief Engineer Combs showed the visitors around the premises, after which the party returned to the Bay State House, where they were entertained with a supper by the Union Water Meter Company.

Evening Session.

The convention was called to order at 7.30, President Hall in the chair.

The President stated that as this session was to be devoted to discussions, he would call for the report of the committee appointed at the Salem meeting to prepare a paper for discussion on the topic: "The causes and prevention of the waste of water." In response, the chairman of the committee, Mr. Nevons, of Cambridge, then presented the following paper:—

The undersigned were appointed a committee to present for discussion at this meeting a paper upon "The causes and prevention of the waste of water."

The matter of leakage and waste of water has been found to be an important factor, in determining the efficiency and economy of all Water Works, and of not less importance than the power of our pumping engines, or the duty they will give.

When the introduction of water into a city or town has been resolved upon, engineers and experts are employed to select a suitable source of supply, and to plan and build the works. As a rule, this work is well done. Arrangements are made for a liberal supply per capita, say 50 to 60 gallons, but, as water has always been considered as free as air, the average water taker does not stop to consider what it has cost to provide him with all the water he may

wish, with no greater effort, on his part, than is required to turn a faucet.

This is the beginning of the trouble.

Again, through unskillful and defective plumbing, leakage and waste commence, water takers become accustomed to the extravagance of themselves and others, and in a short time the supply per capita is increased from the original estimate of 50 or 60 gallons to 75 or 125. The loss by waste and leakage is estimated to be from 30 to 50 per cent. of the whole amount pumped.

What can be done to remedy this enormous loss?

1st. There should be stringent regulations in regard to plumbing, and these should be rigidly enforced.

2d. There should be house to house inspection, persistently pursued. Water takers can in this way be educated to know that no imperfect fixtures, no waste will be allowed.

3d. Meters should be placed in the premises of all manufacturing establishments and large takers.

Meters may fail to register correctly. They will certainly wear out. But intelligent and careful inspection will effectually regulate house fixtures, without complicating the works or materially increasing the cost of maintenance.

Objections have been made to such inspection as giving annoyance to water takers. This we have never known, and it will not occur if proper care is taken to select gentlemanly inspectors.

All works make an annual canvass for the purpose of ascertaining what fixtures exist, that the proper charges may be made. This is a favorable opportunity to make a thorough inspection of every fixture on the premises, from the stop and waste to the tank. If any are not in good condition, notice should be left, that all defects must be remedied, within a specified time, at the expiration of which

time another visit should be made to ascertain if and how the repairs have been made. More time will be required to complete the canvassing, but the results obtained will amply repay the increased expense. In some localities two or three inspections may be required during the year.

The main pipe should be shut off and sounded in sections as small as possible, between midnight and 4 o'clock a. m., when all legitimate consumption is supposed to have ceased. To make this work effectual it is necessary to have sidewalk shut-offs on all supply pipes, so that if there is a noise on the gates, it may be determined whether the leak is in the main or in the supply pipes. Leaks have been discovered in this way which had existed for years, without giving any indications on the surface, as the water found its way into a sewer or along a wall. This work should be carefully done, and no leak should be considered insignificant, for it is the many small leaks that in the aggregate make up a great loss. We are sometimes surprised to see how large is the sum obtained by the addition of a long column of figures, none of which are large. The shutting off of main pipes in the way above mentioned, during the night, when the streets are but little travelled, will also give valuable information concerning the condition of the gates and boxes.

A record of the night consumption should be kept or observations taken as often as opportunity will allow. The months of April and November are favorable for records or observations to be thus compared, and from the information thus obtained a very correct estimate can be formed of the condition of the works.

HIRAM NEVONS,
EDWIN DARLING,
FRANK E. HALL.

MR. LYON said he would like to offer his testimony as to the value of house inspection. Leakage may occur from a variety of causes in houses. The proper remedy is to have a thorough mechanic to do the inspecting. Let him follow the pipe through the house and note each small leak. Another cause of waste is the use of hose. The remedy is to have the hose used at certain hours in the day or for a specified time, which should be fixed by regulation. Such a draught was made at Salem by the use of hose that the main pipe from the reservoir was not of sufficient size to supply the legitimate use. People would tie their hose to spades in the garden and let the water run indefinitely. An inspector was sent to a house where he suspected the people were wasting a large amount of water. The pipe was originally laid to supply two houses, the rate for which would amount to $12. The inspector found attachments had been made at various times and the service pipe was supplying four stores and five families, beside the original two. Out of twenty faucets in one block, all but one were found to be leaking. These two instances show the value of house inspection.

MR. NEVONS said he had expected somebody to attack the report as soon as he had finished reading it. The subject was n't half exhausted. Mr. Hall was a strong meter man and applied meters to prevent waste on house fixtures, while he (Mr. Nevons) had but one hundred and fifty-seven meters in the works under his charge. But in spite of their difference of opinions, they concluded to agree in the report. This matter of leakage must be taken hold of in a business-like way. The speaker didn't know but the time might possibly come when meters would have to be used to preserve the supply, but he hoped not. He wanted to attend to what meters he had and stop further waste by systematic inspections. He caused a thorough inspection to be made every spring and fall, and considered

the duties of the inspector to be of as much importance as those of the superintendent. The main pipes should receive frequent inspection, as well as the service supplies. His method of examining the main pipe for leaks was to shut off a designated section between 12, midnight, and four o'clock, A. M., then slowly open one gate in the section placing the ear to the gate key. Should there be any leak of magnitude within the section the noise of the water rushing through the gate can be plainly heard. After having closed the gate in question, proceed in turn to all the gates in the section and having decided at which point there is apparently the most noise, the location of the leak can then generally be determined with considerable accuracy. He had detected some serious leaks on the mains at Cambridge. On soft territory, they were common and he expected them, but he also found them on high ground where it would not be supposed water could fail to appear at the surface. Yet, such was the case. As an example of a hidden leak of this character, Mr. Nevons gave the following incident:—In a part of Cambridge, where the land is high, the soil of clay, a serious leak was discovered as follows: An inspector entered a house in this location, and in examining the fixtures, could hear a noise like that made by a leak. He failed to detect anything wrong on the premises. He reported that a noise could be heard at this place and was accordingly directed to return to the locality and carefully inspect each house in the vicinity. The supplies to the houses were all found to be in good condition, but still the noise continued. It could be plainly heard at a gate 300 feet away. He had a hole dug at a low place in the street, near where the noise was first detected, and a drain was found in which a large stream of water was flowing. This line of drain was followed up a short distance, when it was found that a joint of a four-inch pipe had entirely blown out. While the section

was shut off for repairing the leak, a gentleman living in a house in the vicinity came out and said that he had heard the noise at a faucet for over eight years, and that it had now ceased. Mr. Nevons supposed of course there would be no more trouble, but to his surprise the next day the same gentleman complained that the noise still continued. Mr. Nevons caused each service supply in the vicinity to be carefully sounded, and selecting the one that was loudest, made an excavation near that point, which was about 200 feet distant from the leak previously found. Having dug through two feet of solid clay they broke through into a stream of water. So much water was running that they were obliged to shut off the section, when a channel was found to have been washed out sufficiently large for a man to crawl through. It followed the line of main pipe for fifteen feet to a house drain, thence along the trench of this drain to the sewer, and finally up the sewer trench twenty feet, where it found an entrance. The water had been flowing through this tunnel for so long a time that its walls were found crystallized throughout its extent. The leak was caused by a four-inch pipe being broken and drawn apart. After this leak was repaired, the noise at this location could no longer be heard. Such a large amount of water was flowing from these leaks that after they were stopped the engineer at the pumping station notified him that he could detect the difference in the consumption.

Mr. Nevons described another leak which was found near the engine house of the Boston and Lowell Railroad at East Cambridge. At this place when the tide was low, he had noticed that a constant stream of water was flowing from a crevice in the dock wall. He supposed that it was caused either from a pocket back of the wall, which was filled when the tide was high, or from an old aqueduct. He was informed by the employees of the corporation that

the stream had been flowing for fully twelve years. When the corporation built their round house, some fifteen or eighteen years ago, they were troubled with water while laying the foundation of the turntable pit. Not feeling fully satisfied regarding the matter, the corporation was notified that the stream might be caused by a leak in the pipe on their premises. They investigated and replied in the negative. He went down one night, and found by shutting off, that the flow of water decreased. The next day he closed in the sections and finally found the leak to be caused by the blowing out of a joint of a flush hydrant located on the premises of the corporation. After this leak was repaired, the difference in consumption was at once noted by the pumping engineer.

MR. DARLING.—What kind of pipes do you use?

MR. NEVONS.—Cast iron pipes. Mr. President, I hope he will be called up. He has brand new works and they have not yet had time to grow old.

MR. DARLING said that the only leaks that he was troubled with were those about the faucet. Sometimes a consumer, finding his bill larger than usual, states that he has not used an increased amount of water. On examination the meter is found to be correct, and the trouble is discovered in the shape of leaky fixtures.

MR. LYON said that eight or nine years ago, he caused a meter to be placed upon the supply pipe of a tannery and soon after a complaint was made that it registered more water than was used. An inspection was accordingly made, and at a point some 200 feet from the tannery a piece of the pipe was found to be eaten entirely off by the liquors of an old abandoned vat. Another case was at the Salem Lead Works. They had a bill of $400 for one quarter, where formerly they had averaged only $100 for the same period. They insisted that the meter was not recording rightly, but the speaker claimed that the trouble was

caused by a leak, and an examination proved that he was correct, the leak being caused by a corrosion of the lead service pipe.

MR. BILLINGS thought that meters gave very good satisfaction. It was easy to take care of them, because they didn't talk back and people did. A house in his city changed hands and the new owner was presented with his bill of some thirty odd dollars. The owner protested. In August there had been a consumption of 10,000 feet, next month a little less, and so in the fall as no leaks were discovered, the meter was changed. The new one showed practically the same result and the house owner was then shown that the meter had proved itself correct. A new meter was placed side of the old one, and the owner was told to use the water as freely as usual, and if it should result in a large use nothing would be charged. But from that time the consumption has been very small, and both meters show the same result. He had not been able to find any leak, but an intermittent leak seemed to be the most plausible explanation.

MR. BALDWIN, who for nine years had been in charge of the shutting off and letting on department of the Boston Water Works, said that it was his custom to have complaints of this kind recorded and a report rendered in writing by the officer who investigated. He believed the meter system a grand thing to stop waste. The system of house inspection is just as good. The two should be combined. Competent inspectors should be employed. Such an inspector could find one or more leaks in a majority of houses. In Boston, whenever pipes are found leaking, the owners are notified to repair. If they do not, a fine is imposed, and if they do not pay the fine the water is shut off, and they are compelled to make repairs. A meter will make the owners or occupants pay for all the water that is wasted. Let an inspector go to a house and inspect the

fixtures thoroughly, and then go to the cellar and shut the stop-cock, and by placing the end of a little iron rod a foot long upon the shut-off cock any leak on that service pipe can easily be detected. The speaker did not think that because the gentleman from Pawtucket had new works it was any sign that leaks might not be found. It is well known that when a pipe from a main to a house lies upon a layer of fine stone there is liability of a break in the spring when the frost works out of the ground or the earth settles from any other cause. There are many cases in which pipes that have been laid a short time are cracked. Many think that whenever there is a leak, it will appear at the surface. His experience had been different. He had found leaks which, as Mr. Nevons said, had been running many years and were detected by some trifling occurrence. There was trouble in Boston with very bad water. Everybody had the spring water craze. A certain spring was noted for its good water and they that used it were delighted with its purity. Suddenly this spring stopped flowing. About a thousand feet distant there was a leak in the water main which had been detected and repaired. The water from this leak had been running underneath the ground where there was a hollow, and supplying the supposed natural spring. Many leaks in iron pipes are caused by their being built across culverts. The water from leaks may run into sewers and not show on the surface at all. The hopper closet is responsible for much waste, as the water in such cases is often turned on and left running for an indefinite time. By discriminating and charging hopper closets $10, unless provided with self-closing faucets, they had been driven almost out of existence in Boston. The speaker thought a proper house to house inspection and a meter system would reduce the consumption one half.

Mr. Nevons said he would like to make one explana-

tion in relation to his method of inspection. It was to avoid sending an inspector into each house. That is, if he shut off a section any time between the hours of 12 and 4, and there is no noise to be heard at the gates he assumes that all the fixtures within the section are in good order.

MR. HODGE gave an account of a leak where he shut off a line of pipe for twenty-four hours and a spring in the wheel-pit of a neighboring manufactory dried up as the result. A two-inch pipe had been run into a six-inch some fifteen feet below the surface and the plug had blown out. It had run for ten years in this way. He could detect leaks on the main pipes by going into the houses and listening at the place where the service pipe enters.

MR. BALDWIN gave an instance of a forty-inch pipe being entirely broken off by simply running across a culvert. There was no defect in the pipe to cause it.

MR. DARLING asked what the pressure was in Boston.

MR. BALDWIN replied that it varied on high and low ground, but ranged from thirty to eighty pounds.

MR. DARLING said his experience had been confined to nothing less than sixty-five pounds to start with, and ran up to a hundred and thirty, and when a lead joint blew out it generally showed itself above ground in a short time.

MR. BALDWIN inquired whether the gentleman was of the opinion that a leak would necessarily appear at the surface if there was an easier way for it to find an outlet.

MR. DARLING replied: No, sir, and further said he was fortunately situated with but very few sewers and considerable country road. In his case, the water always appears on the surface when there is a leak in the pipes.

MR. LYON inquired whether any one had had any experience with waterphones.

MR. DARLING said he had tried one and it gave very good satisfaction. He had sent it to Mr. Nevons, of Cambridge, who, no doubt, had a report to make.

MR. NEVONS replied that before he said anything about the waterphone he wanted to say a word to the gentleman concerning his pressure. He then told of a superintendent who had a pressure on his pipes equal to that stated by Mr. Darling, and whose leaks did not come to the surface. In his opinion, Mr. Darling's soil was sandy.

MR. NEVONS here stated the cost of operating his works, showing that they were self sustaining. He thought it would be otherwise should the meter system be adopted in Cambridge. If such a system were adopted in his city it would be necessary to charge a minimum meter rate of at least ten dollars for all of that class of houses from which they now receive twenty-two dollars, and as they have a large number of five dollar rate houses it would be necessary to fix another minimum rate for them. Even in this case, it might become necessary to levy a special tax to meet any deficiency that might occur. He had tried the waterphone. At first, he began to grow scared and thought there was a leak every where. It is very sensitive. His only objection is, that it is a little too cumbersome. He carried a gate wrench when out inspecting, and liked it full as well. For a new inspector he should say that the waterphone, being so sensitive, was a very good thing.

MR. DARLING said the gentleman from Cambridge condemned meters because they would affect his pocket book, but he claimed that they would increase the revenue. It had done so in Pawtucket, where during the past year they had paid the maintenance, interest, and four thousand dollars on the sinking fund. He believed it to be one of the very best preventives of waste. Yet he would acknowledge the importance of thorough inspection and he causes a thorough inspection of all fixtures to be made annually, whether or not there is a meter on the premises. So far as leaks on the main are concerned, all are liable to them. The police used to call him out in the night, but he has

requested them not to unless the leak was the size of a man's arm. He had a case on Main street, Pawtucket, where a lead joint blew out and filled a six-inch pipe which was laid for a force pump a hundred and fifty feet down the street, and then it came up through the paving.

MR. NEVONS. I am glad you are coming to own it.

MR. DARLING said that he never denied that they leaked in that way, but he said as soon as a leak occurred, the pressure would bring it to the surface.

MR. ELLIS said one who died a great many years before he was born, wrote

> " 'Tis with our judgments as our watches, none
> Go just alike, yet each believes his own."

Thus each individual is in danger of making too broad an application of his own experience. Mr. Darling has had the benefit of starting with all meters and so gets a return for all water delivered consumers, but of our older works which have grown up with a tariff rate and where meters are optional, we find but two classes using them.

First. Those using large houses with all the modern improvements and having small families, thus avoiding the regular or fixture rate.

Second. Those whose use of water is perceptibly so large that the water officials put on a meter in order to get a fair return for the water delivered.

Between these two classes exists a large range of customers, from some of whom the department would gain and from others, lose by their use. To require all consumers to put on meters would involve some cases of individual hardship, while for the municipality to do so, would be to incur a large expense. Neither is the demand a fair one that all consumers shall pay for just what they use and no more.

Aside from the sanitary requirement for the use of a certain amount of water for personal cleanliness and the removal of household wastes regardless of cost, and which

in many instances the use of a meter would tend to restrict, there is a question whether water under pressure, delivered in small quantities, should be valued simply by its volume. No group of neighbors on a mountain side would expect to unite in bringing a spring half a mile, and then fix an arbitrary price per gallon on the water each might use, regardless of the element of cost or the benefits and advantages to each.

A town is but a large group. To have water delivered under pressure at any point of one's house, for tank, bath, or boiler, or even hose, is of value beyond the precise amount of water used. The cost of a certain proportion of the plant, the pipes in front of the premises, and the cost of maintenance, in short the cost of the *ability*, must not be overlooked, and where meters are used we have added the extra labor of reading and examining them. For these reasons, if meters are to be used, there should be a minimum rate per *family*, for family use and in all other cases, per meter. Substantially this plan is followed in Springfield. Yet when meters are applied to families, we almost always lose, as it is only those who are most careful regarding waste, who apply them. To be effective in checking waste, their application must be general, or the revenue will be reduced without accomplishing the object desired.

Neither could he agree with Mr. Darling as to the improbability of leaks in the mains existing for a long time without being discovered. When the streets of his town contain as many old drains, sewers and other underground channels for the passage of water as do those of many towns represented by those who have spoken, and when his pipes have been down fifteen to twenty years, such experience will not be so uncommon. Mr. Ellis had met several instances in his own experience where considerable streams had run into sewers and into gravel for a long time before being discovered.

Whether the water from a leak comes to the surface, or passes away underground through the earth or otherwise, depends upon the relation of the porosity of the ground or the size of the channel to the size of the leak.

MR. COGGESHALL gave his experience with the water-phone. He had been able by it to check much waste through the finding of leaks.

MR. LYON thought one cause of waste is the using of street hydrants by those who ought not to use them. He wanted the opinion of some gentleman who had cement lined pipe.

MR. HAWKES, in reply to Mr. Lyon's inquiry, stated that he did not have any trouble whatever with the cement lined main pipe at Malden. In reference to the best method of detecting leaks he thought it an excellent plan to divide a city into a number of sections, and at some convenient point in each section, cause a mercury gauge to be attached. By ascertaining the exact difference in levels between each gauge and the head of water in the distributing reservoir we learn what the actual pressure should be. At midnight there is a very little legitimate consumption; accordingly each gauge should indicate the full number of pounds for its level. The speaker related an incident in his experience when acting as an inspector for the City of Boston. They had been testing several sections with gauges as above described, and when at work on the section which includes the Charles street jail they noticed the indications of an existing leak. Upon investigation, a large amount of water was found flowing through a sewer. After two weeks search the leak was finally detected and repaired. The land on Charles street, in front of the jail, is filled and a ten-inch pipe had been laid from Cambridge street through this filled land. The leak was occasioned by this pipe being broken square across, caused no doubt, by settlement of the earth.

THE PRESIDENT here briefly summarized the discussion concluding that the causes of waste were of a local character and that every superintendent must rely on his own judgment to remedy troubles of this kind, whenever they occur.

The committee appointed at the last meeting to prepare papers on the subjects: "Uniformity in compiling annual reports" and "Water Meters," failed to render any report. Thereupon, the President announced a general discussion on "Water Meters."

MR. BROWN asked Mr. Darling if he thought the revenue would be increased if there were no minimum rate.

MR. DARLING said he did not know.

MR. BROWN asked if he thought it would be increased by having parties pay for what their meters registered, without a minimum rate.

MR. DARLING said he had never investigated the subject, and should not care to answer without doing so.

MR. BROWN said he thought it made much difference whether there was a minimum rate or not. Take a house in Worcester that formerly paid twenty-two dollars, and since meters have been attached we cannot get four dollars. But it is always claimed that we would be oppressing the poor people by establishing the minimum rate. The speaker argued that the poor were benefitted. When we tried to put the minimum rate up to five dollars they said it was ridiculous.

The speaker said he was in for meters every time. He thought Worcester would not have had a supply the last few years were it not for meters. Some would allow thousands of gallons to escape. Others would operate on their waste stops so as to diminish the pressure and thus allow water to pass through the meters without its being registered. Others would allow a very small stream to run, with similar effect. They have streams small enough so

that he could not get three dollars from parties that once paid fifty. He claimed that under a minimum rate they would receive nearer the value of the water, but they hadn't been able to get at it. He was getting twenty-five cents a thousand; over a thousand, twenty cents; and over five thousand, fifteen cents.

MR. SCHLEITER was surprised to hear that meters reduced the revenue. In his place, from sixty-five meters, nine thousand dollars were collected, where formerly only five thousand were received. They had a contract with a company who paid for an estimated amount. We compelled them to put on meters and their rate amounted to more than double what they had paid by contract.

MR. BROWN wanted to know how many referred to large instead of domestic consumers. He considered them two different classes. He should certainly put meters on the large consumers. They go over because they want water with direct pressure.

MR. SCHLEITER gave several instances of increase of rate in case of stores and private families.

MS. ELLIS said he agreed with Mr. Brown as to there being two classes.

MR. BILLINGS gave, as confirming Mr. Brown's theory, the figures of his department for 1882. For eighty-one millions of gallons sold by meter rates they received over twelve thousand dollars, and for one hundred and thirty-one millions by tariff rates they received a little over thirteen thousand dollars. Fourteen cents a thousand was received for metered water, and ten cents for the water at tariff rates. Nearly half the amount for metered water was received from minimum rate consumers, but the consumption is only one-fourth. The domestic meters used sixteen millions and the larger ones sixty-four millions.

MR. BROWN said that was his point. They are lame in Worcester, because they do not have a minimum rate.

MR. HATHAWAY said he had only a dozen meters and the smallest consumers had them.

MR. DARLING advocated a minimum rate. He proposed to make a report next year on the working of meters. When he made his annual inspection he did not find fifty dead meters out of seventeen hundred. They worked accurately.

THE PRESIDENT here called upon the Hon. Phineas Ball to say a word for meters.

MR. BALL said that he thought that whenever meters were used on houses to measure water for domestic use a minimum rate should be charged. The reasons for making such a charge are many. One is that the time required to take care of a meter measuring a small amount of water is nearly the same as when a large quantity is used. The entry of the reading in the proper books, the making of the bills, and collection of the same, consume as much of the officials' time, and is as costly in the first instance as in the other; and next, a minimum rate prevents the tendency of the taker of being too saving for his own good in the use of water. Then there is a further and a larger reason for charging a minimum rate than those just mentioned. It is the value which a public water supply gives to property in a city or village which is independent of the use which the private citizen may make of the water. This independent value is the advantage of protection of property from being destroyed by fire. The value for fire purposes is so great as not to be easily computed in dollars and cents. Then there is the general benefit which individuals derive from the public water supply, that of better protection and maintenance of the public health, by reason of a purer water supply than can possibly be procured from the old time surface well. These benefits are common to each individual consumer, whether the supply taken be much or little, and for which in equity

every taker is bound to contribute his share toward the public or common cost. To reach this, where meters are used, the most direct way is by what is known as the minimum rate. Large consumers, where their business enterprise contributes to the general prosperity, should be charged only according to the quantity used.

Refering to the anomaly in the City of Worcester, he said he had three in his family and a stable, and his last six months' bill was only ninety-five cents, and that he did not believe he had ever paid over two dollars per annum since his meter was put on. This is too little for any one consumer to pay for the general and private benefit derived from a public water supply. A minimum rate should not be less than five dollars, and at this rate, it should be as cheap as the pumps on ordinary estates could be kept in repair.

MR. HYDE said people are very careful not to use too much water when meters are first put in, but soon begin to exceed the minimum rate.

MR. DARLING confirmed Mr. Hyde's experience as to the freedom with which people use water.

The meeting was here open for general discussion.

On motion of Mr. Nevons, voted that the hearty thanks of this Association are hereby extended to the Union Water Meter Company for the marked courtesies extended toward us this day.

MR. LYON asked for information in regard to formations on the inside of cement lined service pipes.

MR. HAWKES said they were troubled that way in Malden. He knew of no way but to disconnect the pipe and bore it out.

MR. HALL said he was troubled in the same way and took up a hundred and eighty last year. He would like to know how long it was in forming.

MR. LYON said his was put down in 1872.

MR. HALL said one peculiarity of his, was that it would form under a high pressure as well as a low one.

MR. NEVONS said he used galvanized iron supply pipes and would like to know what the majority used.

MR. HYDE said he used galvanized pipe till he found it affected his meters with rust. This year they had begun to use enamel.

MR. HALL said he used wrought iron cement lined pipe. He had also tried rubber coated pipe and galvanized pipe. The galvanized pipe he had found would last ten, twelve, and possibly fourteen years without giving much trouble. The rubber coated did not last long.

MR. FISK related an incident of a gentleman who had a reservoir of his own and used a galvanized service pipe. His son and horse both died of lead poisoning.

MR. NEVONS said he was advised by a fine chemist not to use the enamel pipe. There is no trouble with the galvanized. There is a milky sediment in water when that pipe is first used, not enough to do any injury. He thought that if the gentleman spoken of was injured it was because he did not use water enough to keep a free circulation in his pipes.

MR. ELLIS said that in his city galvanized pipes would rust quicker than plain iron. He had put in iron pipe entirely.

MR. HYDE said the effect of tarred iron pipe was generally gone inside of six months and then the pipe filled with rust. He did not consider it any better than plain black pipe.

MR. BILLINGS thought it very important that careful observations should be made and the exact conditions noted.

MR. HAWKES had had the same experience with galvanized iron and now used plain lead. It rarely impregnates.

MR. COGGESHALL said lead was used in New Bedford, with very satisfactory results.

MR. FISKE thought the trouble was in the water, not in the pipe.

MR. LYON said the best substitute for a lead pipe he ever saw was an iron pipe covered with glass.

In response to a suggestion from the chairman, MR. LYON mentioned "Pollution of imponded water" as a subject for discussion at the next meeting.

MR. NEVONS thought that a subject too difficult for them to deal with.

On motion of MR. BILLINGS, voted that the hearty thanks of this convention are hereby extended to President Hall, Water Registrar Brown, Mayor Hildreth, City Engineer Allen, Chief Engineer Combs, and all others who have assisted in making this an interesting and profitable meeting.

On motion of the SECRETARY, voted that the assignment of topics be left with the executive committee.

MR. DARLING called upon Mr. Ellis as one of the vice presidents of the American Water Works Association, to tell about the recent meeting at Buffalo.

MR. ELLIS, after giving a resumé of the meeting and a short notice of the papers presented, said that the American Water Works Association was one that every member of the New England Association should join. Its objects and the experience of its members were practically the same. Its larger range of membership served to give a broader field and more extended scope of observation.

Two years had served to develop two substantial points of difference. First, that those western cities and towns dependent for their supply on sediment bearing streams, required basins or reservoirs for sedimentation or settling purposes, before the water could be acceptably delivered to their customers.

Second, in the east many towns supplied from natural or artificial ponds were troubled by the growth and decay of algæ.

These two points aside, the important questions of con-

trolling the waste of water, by meters, house to house inspection or other methods; the use of motors, elevators, and the supply of water for fire protection, the kind of pipe to be used, both for mains and services; the method of estimating the duty of pumping engines; economy of management and the great number of questions, like the resistance of flow of water in pipes, and others which are almost daily arising in the practice of every water works official are essentially the same.

MR. ELLIS further said that he hoped that every member of the New England would endeavor to attend the fourth annual meeting of the American Association, at Cincinnati, Ohio, April 15, 16 and 17, 1884, where he felt sure a most hearty welcome would be offered them and that the information gained would amply repay the cost and labor of attendance.

The convention then adjourned sine die.

Agreeable to the invitation of the Chapman Valve Manufacturing Company the members of the Association left Worcester on Friday, June 22d, for Indian Orchard, at which place the works of the Company are located. Three hours were most profitably spent here. The details of manufacturing valves and hydrants were minutely shown and explained. Among other things which attracted attention was a hydrant throwing four streams, arranged with supplementary valves so that any one could be cut off or let on without interfering with the other streams. The members of the Association were then driven through Indian Orchard village, thence to the Warwick House at Springfield, where they were entertained with a dinner by the Chapman Valve Manufacturing Company, after which on motion it was unanimously voted that the thanks of the members present are hereby extended to the Chapman Valve Manufacturing Company, through Mr. Jason Giles,

its manager, for the pleasant time we have all enjoyed, the profitable instruction we have received, and the very gentlemanly manner which has been exhibited toward us this day.

An invitation was then extended to the members of the Association by the Springfield Water Commissioners to resume seats in the carriages. They were then driven to West Springfield, and on the return to Springfield proper, the picturesque view from the tower of the Springfield Armory called forth plaudits from all. At the engine house near the City Hall, Chief Engineer Leshure made a display of hydrant streams. A fine stream was shown by combining three lines of leading hose into one by means of what is known as the "Siamese butt." The Water Department building was next visited, at which place the following resolution was unanimously adopted:

Voted that the cordial thanks of this Association are hereby extended to the Springfield Water Commissioners, City Engineer Ellis, Chief Engineer Leshure and all others who, by their generous hospitality, have contributed so greatly to our pleasure this day.

MEETING AT PAWTUCKET, R. I.

WEDNESDAY, SEPTEMBER 19, 1883.

The members of the Association, together with their invited guests, assembled at the rooms of the Business Men's Association shortly after nine o'clock. Invitation was extended to all present to take seats in carriages which were in front of the building, and the party was conveyed to the many interesting points connected with the Pawtucket Water Works. The procession first visited the distributing reservoir. The beautiful view from this elevated spot was much admired. The party next proceeded to the new pumping station. The machinery at this place consists of four of Corliss's horizontal double acting crank pumps, connected in pairs. The power which operates these pumps is either by steam from a Corliss horizontal condensing engine, or by water from two turbine water wheels. Examination was made of the new filter bed. The supply of water enters beneath, passes upward through two feet of filtering material and thence flows into the pump well. The next stop was made at the old pumping station. At this place is located the Corliss pumping engine, which is noted for having developed an unsurpassingly high rate of duty. The party then returned to the rooms of the Business Men's Association, at which place they were called to order and Franklin A. Steere, Esq., President of the Town Council, made a short address, welcoming the visitors to Pawtucket. President Hall briefly responded, extending thanks for the generous hospitality displayed. A substan-

tial collation was then served, during which each visitor was the recipient of a button hole bouquet. The party then proceeded to Wilkinson's Park, where a fine exhibition of fire streams was made, under the direction of Chief Engineer Collyer. Six streams were thrown 112 feet perpendicular, with a nominal pressure of ninety-five pounds at the hydrants. The Association was then escorted by the entire fire department, to the steamer Pioneer, which conveyed the party down the Pawtucket and Providence rivers, to Vue de L'Eau Club Grounds, where a bountiful shore dinner was served, with the "Compliments of the Water Commissioner, Superintendent, and Business Men of Pawtucket."

While on the boat each visitor was presented with a watch charm in the form of a clam.

As the steamer went through the draw of the India Point bridge a fine display of fire streams was made by a squad of East Providence firemen.

Previous to the dinner a record of the names of those present was made by the Secretary. The following is the number:

Active Members	24
Fine Members	4
Candidates for membership	6
Members of Water Boards and Fire Departments from various cities	36
Officials Town of Pawtucket, together with a representation of Business Men of same place	58
	128

BUSINESS MEETING.

After the dinner the members were called together by President Hall, and in the absence of the Secretary, J. Stewart Brown was elected Secretary pro tem.

The following list of applicants for active membership

was presented, each being endorsed by the Executive Committee :—

Daniel S. Brinsmade,	Civil Engineer,	Birmingham, Conn.
J. Henry Brown,	Supt. Mystic Division,	Charlestown District, Boston.
Nathaniel Dennett,	Supcrintendent,	Somerville, Mass.
Horace H. Knapp,	Clerk of Water Board,	Lowell, Mass.
Alvoid O. Miles,	Superintendent,	East Providence, R. I.
James W. Morse,	Superintendent,	Natick, Mass.

The foregoing were then elected members.

Letters were then read from W. F. & F. C. Sayles, the Pawtucket Gas Company, The Pawtucket Hair Cloth Company, the Conant Thread Company and the Fales & Jenks Machine Company, inviting the members of the Association to visit their respective manufactories.

Voted that the communications from the business men of Pawtucket be received and placed on file, and that the thanks of this Association be returned and entered upon the records.

Voted to adjourn to the call of the President on the boat.

While on the steamer Pioneer, steaming up the beautiful Providence river, the members were assembled, and on motion of Mr. Ellis of Springfield, the following vote was unanimously carried :—

Voted that the thanks of this Association be tendered to the town officials and business men of Pawtucket for attentions shown the Association this day, and that the same be entered upon the records.

Col. Haggett, President of the Lowell Water Board, extended an invitation to those present to visit Lowell in June next, on the occasion of the third annual meeting of the New England Water Works Association, which is to be held in that city.

In conclusion, special mention should be made of the

credit due Superintendent Darling for the admirable management displayed in carrying through the programme of the day. The arrangements were promptly executed, consequently every moment was fully occupied, from the time the visitors arrived until they departed.

MEMBERSHIP OF THE NEW ENGLAND WATER WORKS ASSOCIATION.

ACTIVE MEMBERS.

Richard W. Bagnell,	Superintendent,	Plymouth, Mass.
James M. Battles,		Lowell, Mass.
William R. Billings,	Superintendent,	Taunton, Mass.
Thomas H. Brady,	Superintendent,	New Britain, Conn.
Daniel S. Brinsmade,		Birmingham, Conn.
J. Henry Brown,	Supt. Charlestown District,	Boston, Mass.
J. Stewart Brown,	Registrar,	Worcester, Mass.
Jonas M. Clark,	Superintendent,	Northampton, Mass.
Robert C. P. Coggeshall,	Superintendent,	New Bedford, Mass.
J. Warren Cotton,	Registrar,	Cambridge, Mass.
Edwin Darling,	Superintendent,	Pawtucket, R. I.
Nathaniel Dennett,	Superintendent,	Somerville, Mass.
William T. Dotten,	Superintendent,	Winchester, Mass.
George A. Ellis,	City Engineer and Registrar,	Springfield, Mass.
Albert S. Glover,	Registrar,	Newton, Mass.
Robert M. Gow,	Superintendent,	Medford, Mass.
Sherman E. Granniss,	Superintendent,	New Haven Conn.
Frank E. Hall,	Commissioner,	Worcester, Mass.
Joseph C. Hancock,	Superintendent,	Springfield, Mass.
James H. Hathaway,	Registrar,	New Bedford, Mass.
Ward W. Hawkes,	Superintendent,	Malden, Mass.
William F. Hill,	Superintendent,	Dedham, Mass.
Thomas A. Hodge,	Superintendent,	North Adams, Mass.
Horace G. Holden,	Superintendent,	Lowell, Mass.
David W. Horan,	Superintendent,	Clinton, Mass.
Horatio N. Hyde, Jr.,	Superintendent,	Newton, Mass.
Nathaniel I. Jordan,	Treasurer,	Auburn, Maine.
Moses Joy, Jr.,	President and Superintendent,	Milford, Mass.
Horace H. Knapp,	Clerk,	Lowell, Mass.
Addison Lane,	Superintendent,	Melrose, Mass.
Thomas C. Lovell,	Superintendent,	Fitchburg, Mass.
James W. Lyon,	Superintendent,	Lynn, Mass.